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The Clementine II Mission

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Abstract

The Clementine II mission plans to fly by three Earth-crossing asteroids and deliver an instrumented probe to each. The mission is in the initial design stage. The schedule goals are to launch in mid-1998 and perform three asteroid flybys within 12 months. Each flyby would occur with the asteroid within ~0.1 AU of Earth, allowing optical and possibly also radar tracking of the engagement from Earth. The main bus spacecraft would carry a multispectral suite of imaging sensors, with options to carry a laser ranger, a flash spectrometer, and other sensors. Each probe would be an autonomous spacecraft with guidance, attitude control and propulsion, and would carry its own imaging and tracking sensors. The probe would fly from the bus to the asteroid, impacting ~10-30 seconds before the bus reaches its closest approach of ~ 50 km to the asteroid. Imagery and other sensor data from the probe would be relayed to the bus, recorded and transmitted back to Earth along with data from the bus sensors. Probe impact cratering dynamics and morphology observed from the bus should provide information on the structure and composition of the asteroid. Rapid-flyby missions are the least expensive way to sample a statistically-meaningful number of Earth-crossing objects, if significant information can be collected in the brief period of the flyby. The Clementine II mission gives us an opportunity to discover how much we can learn about asteroids in this scenario.

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